



U.S. Department
of Transportation

**Federal Aviation
Administration**

Memorandum

Subject: **ACTION:** Equivalent Level of Safety, SIAI
Marchetti S211A, 14 CFR Part 23, § 23.677(a)
Trim Systems; Finding No. ACE-95-5

Date:

APR 06 1995

From: Manager, Standards Office, ACE-110

Reply to
Attn. of:

To: Manager, Small Airplane Directorate, ACE-100

This memo documents concurrence with an equivalent level of safety to 14 CFR Part 23, § 23.677(a) for the trim system.

BACKGROUND:

The SIAI Marchetti Model S211A is a two-place (tandem), all metal, mid-wing cantilevered, retractable gear, pressurized, single turbofan engine airplane with a maximum weight of 6,394 pounds intended for specialized military (public aircraft) operations as a 14 CFR Part 23 airplane in the Acrobatic Category. SIAI Marchetti, with the S211A, is competing for the Joint Primary Aircraft Training System (JPATS) contract. The S211A is equipped with Martin Baker MK-10 ejection seats.

APPLICABLE REGULATIONS:

Section 23.677(a) requires that proper precautions be taken to prevent inadvertent, improper, or abrupt trim tab operation. There must be means near the trim control to indicate to the pilot the direction of trim control movement relative to airplane-to-airplane motion. In addition, there must be means to indicate to the pilot the position of the trim device with respect to the range of adjustment. This means must be visible to the pilot and must be located and designed to prevent confusion.

DISCUSSION:

SIAI Marchetti offered the following responses to questions asked by the FAA.

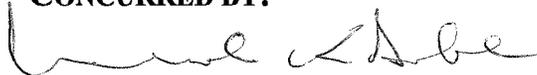
- The rudder trim center annunciator light (green) operates only on the ground (weight-on-wheel switch) to indicate the neutral trim position for takeoff.
- The rudder takeoff trim position is neutral.
- The pre-takeoff procedures require setting the rudder trim to neutral, as indicated by the illumination of the green light. If there is no light indication, the cause must be investigated. The system, therefore, provides a pre-flight self check.
- A double-section rudder trim switch precludes single failure run-away trim. Directional trim requirements on the S211A are minimal considering both the fuel tank arrangement, and the single turbofan engine with the no stores configuration. Application of mis-trim is clearly evident through the increase in pedal forces and the turn-and-slip indicator. All normal trim forces are within the FAR 23.143 prolonged force limitations. Inadvertent full travel mis-trim results in forces well below the transient limits of the same paragraph.

FAA'S POSITION:

The trim position indicator requirement allows the pilot to check proper rudder trim position before takeoff. We believe, but have been unable to verify, this requirement was based on the majority of Part 23 airplanes using propellers. Propeller effects necessitate use of rudder to keep the rotation and climb portions of takeoff coordinated. A centerline thrust turbojet is not subjected to these effects and rudder requirements are minimal; therefore, the rudder trim center light provides the same level of safety as intended in § 23.677. A split switch arrangement for the trim switch is acceptable regarding trim run-away and a range of adjustment is irrelevant because the takeoff setting is neutral and in-flight mis-trim cues are obvious to the pilot. Additional safety is provided by low rudder forces at full deflection. These features provide the same level of safety originally intended by this requirement.

The certification basis for the Model S211A will include this equivalent level of safety finding for § 23.677(a).

CONCURRED BY:



4/6/95

Manager, Standards Office, ACE-110

Date


 Manager, Small Airplane Directorate
 Aircraft Certification Service, ACE-100

4/6/95
 Date